Mathematical Model

Parameters (Inputs):

𝑖 ϵ 1,2, ( 𝐼𝑛𝑑𝑒𝑥 𝑓𝑜𝑟 Makeup-lipstick, blush)

𝑇𝑖 ∶ 𝑁𝑢𝑚𝑏𝑒𝑟 𝑜𝑓 𝑡𝑦𝑝𝑒 𝑖 makeup 𝑡ℎ𝑎𝑡 𝑐𝑜𝑢𝑙𝑑 𝑏𝑒 𝑝igmented 𝑝𝑒𝑟 𝑑𝑎y

𝐴𝑖 ∶ 𝑁𝑢𝑚𝑏𝑒𝑟 𝑜𝑓 𝑡𝑦𝑝𝑒 𝑖 makeup 𝑡ℎ𝑎𝑡 𝑐𝑜𝑢𝑙𝑑 𝑏𝑒 𝑎𝑠𝑠𝑒𝑚𝑏𝑙𝑒𝑑 𝑝𝑒𝑟 𝑑𝑎y

𝑃𝑖 ∶ 𝑃𝑟𝑜𝑓𝑖𝑡 𝑒𝑥𝑝𝑒𝑐𝑡𝑒𝑑 𝑓𝑟𝑜𝑚 𝑒𝑎𝑐ℎ 𝑡𝑦𝑝𝑒 𝑖 makeup

Decision Variables:

𝑥𝑖 ∶ 𝑁𝑢𝑚𝑏𝑒𝑟 𝑜𝑓 𝑡𝑦𝑝𝑒 𝑖 makeup 𝑚𝑎𝑛𝑢𝑓𝑎𝑐𝑡𝑢𝑟𝑒𝑑

𝑀𝑖𝑛𝑖𝑚𝑖𝑧𝑒 𝑇𝑜𝑡𝑎𝑙 𝑃𝑟𝑜𝑓𝑖𝑡 = ∑(𝑥𝑖 ∗ 𝑃𝑖)

Constraints:

𝑥𝑖 ≥ 0; (1) 𝑁𝑜𝑛 𝑁𝑒𝑔𝑎𝑡𝑖𝑣𝑒 𝑐𝑜𝑛𝑠𝑡𝑟𝑎𝑖𝑛𝑡

∑(𝑥𝑖/𝑇𝑖) 2 𝑖=1 ≤ 1 (2) 𝑃𝑒𝑟 𝑑𝑎𝑦 𝑙𝑖𝑚𝑖𝑡𝑎𝑡𝑖𝑜𝑛𝑠 𝑓𝑜𝑟 pigmenting 𝑡ℎ𝑒 makeup

∑(𝑥𝑖/𝐴𝑖) 2 𝑖=1 ≤ 1 (3) 𝑃𝑒𝑟 𝑑𝑎𝑦 𝑙𝑖𝑚𝑖𝑡𝑎𝑡𝑖𝑜𝑛𝑠 𝑓𝑜𝑟 𝑎𝑠𝑠𝑒𝑚𝑏𝑙𝑖𝑛𝑔 𝑡ℎ𝑒 makeup